EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	2	("4968940" "5892361").pn.	US-PGPUB; USPAT	OR	ON	2006/06/09 12:54
L3	5	("5144245" "6430509" "6591195" "6618876" "6631328").pn.	US-PGPUB; USPAT	OR	ON	2006/06/09 12:56
L4	5	("5144245" "6430509" "6591195" "6618676" "6631328").pn.	US-PGPUB; USPAT	OR	ON	2006/06/09 12:58
L5	110	("5144245" "6430509" "6591195" "6618676" "6631328" "4968940" "5892361")	US-PGPUB; USPAT	OR	ON	2006/06/09 13:08
L7	17	("5144245" "6430509" "6591195" "6618676" "6631328" "4968940" "5892361") and model and ((look same up same table) or look-up or look same up)	US-PGPUB; USPAT	OR	ON	2006/06/09 13:05
L8	18	("5144245" "6430509" "6591195" "6618676" "6631328" "4968940" "5892361") and look-up	US-PGPUB; USPAT	OR	ON	2006/06/09 13:09
L9	47	("6366858" "6591195" "6631328" "6163155" "6476609" "6777940" "6216090" "6216090" "5966013" "6184685" "6218842" "6211678" "6218842" "6538447" "5661402" "6092024" "4451789" "4553097" "5811973" "6297639" "6384605" "6411087" "6211678" "6353321" "5867806" "6377050" "4899112" "4949045" "4968940" "5495174" "4278941" "4360778" "4916400" "5963036" "6703837" "5469062" "4107597" "4300098" "4511843" "4529938" "5187661" "5210495" "5233522" "5345179" "5892460" "6020741" "6026913" "6181138" "6188222" "5626200").pn.	US-PGPUB; USPAT	OR	ON	2006/06/09 15:32

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S2	22	earth same formation same borehole same model$3 and estimat$3 same electrical same parameter$3 and earth same formation and (borehole or (bore same hole) or well same bore or wellbore)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/06/08 17:28
S3	21	earth same formation same borehole same model$3 and estimat$3 same electrical same parameter$3 and earth same formation and (borehole or (bore same hole) or well same bore or wellbore) and (conductivity or dielectric or electric)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/06/09 12:52
S4	5	earth same formation same borehole same model$3 and estimat$3 same electrical same parameter$3 and earth same formation and (borehole or (bore same hole) or well same bore or wellbore) and (conductivity or dielectric or electric) and transform$4	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/06/08 17:34
S5	5	earth same formation same borehole same model$3 and estimat$3 same electrical same parameter$3 and earth same formation and (borehole or (bore same hole) or well same bore or wellbore) and (resistivity or conductivity or dielectric or electric) and transform$4	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2006/06/08 17:34

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Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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L3	5	("5144245" "6430509" "6591195" "6618876" "6631328").pn.	US-PGPUB; USPAT	OR	ON	2006/06/09 12:56
L4	5	("5144245" "6430509" "6591195" "6618676" "6631328").pn.	US-PGPUB; USPAT	OR	ON	2006/06/09 12:58
L5	110	("5144245" "6430509" "6591195" "6618676" "6631328" "4968940" "5892361")	US-PGPUB; USPAT	OR	ON	2006/06/09 12:58
L7	17	("5144245" "6430509" "6591195" "6618676" "6631328" "4968940" "5892361") and model and ((look same up same table) or look-up or look same up)	US-PGPUB; USPAT	OR	ON	2006/06/09 13:05

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Infinitesimal

From Wikipedia, the free encyclopedia

In mathematics, an **infinitesimal**, or infinitely small number, is a number that is smaller in absolute value than any positive real number. A number x is an infinitesimal if and only if for every integer n, $|nx|$ is less than 1, no matter how large n is. In that case, $1/x$ is larger in absolute value than any positive real number. Nonzero infinitesimals, obviously, are not real numbers, so "operations" on them are not familiar.

History of the infinitesimal

The first mathematician to make use of infinitesimals was Archimedes, although he did not believe in their existence. See the article on how Archimedes used infinitesimals. The Archimedean property is the property of an ordered algebraic structure of having no nonzero infinitesimals.

In India from the 12th century until the 16th century, infinitesimals were discovered for use with differential calculus by Indian mathematician Bhaskara and various Keralese mathematicians.

When Newton and Leibniz developed the calculus, they made use of infinitesimals. A typical argument might go:

To find the derivative $f'(x)$ of the function $f(x) = x^2$, let dx be an infinitesimal. Then,

$$\begin{aligned} f'(x) &= \frac{f(x+dx)-f(x)}{dx} \\ &= \frac{x^2+2x\cdot dx+dx^2-x^2}{dx} \\ &= 2x+dx \\ &= 2x \end{aligned}$$

since dx is infinitesimally small.

This argument, while intuitively appealing, and producing the correct result, is not mathematically rigorous. The use of infinitesimals was attacked as incorrect by Bishop Berkeley in his work *The Analyst: or a discourse addressed to an infidel mathematician*. The fundamental problem is that dx is first treated as non-zero (because we divide by it), but later discarded as if it were zero.

It was not until the second half of the nineteenth century that the calculus was given a formal mathematical foundation by Karl Weierstrass and others using the notion of a limit. In the 20th century, it was found that infinitesimals could after all be treated rigorously. Neither formulation is right or wrong, and both give the same results if used correctly.

Modern uses of infinitesimals

Infinitesimals are legitimate quantities in the non-standard analysis of Abraham Robinson, which makes use of hyperreal numbers. In this theory, the above computation of the derivative of $f(x) = x^2$ can be justified with a minor modification: we have to talk about the *standard part* of the difference quotient, and the standard part of $x + dx$ is x.

Alternatively, we can have synthetic differential geometry or smooth infinitesimal analysis with its roots in category theory. This approach departs dramatically from the classical logic used in conventional mathematics by denying the law of the excluded middle--i.e., *not* ($a \neq b$) does not have to mean $a = b$. A *nilsquare* or *nilpotent* infinitesimal can then be defined. This is a number x where $x^2 = 0$ is true, but $x \neq 0$ can also be true at the same time. With an infinitesimal such as this, algebraic

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2	324/341

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11	702/7
6	324/335
6	324/343
5	324/338
5	324/341
2	175/45
2	175/50
2	324/342
2	702/11

Combined Classifications

32	324/338
20	702/7
19	324/339
7	324/341
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2	175/50
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        324/323        OF GEOPHYSICAL SURFACE OR SUBSURFACE IN SITU
        324/332        .With radiant energy or nonconductive-type
                            transmitter
        324/334        ..With separate pickup
        324/338        ...Within a borehole

 20  702/7          (9 OR, 11 XR)
        Class    702 :  DATA PROCESSING: MEASURING, CALIBRATING, OR
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        702/1          MEASUREMENT SYSTEM IN A SPECIFIC ENVIRONMENT
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        702/6          ..Well logging or borehole study
        702/7          ...By induction or resistivity logging tool

 19  324/339        (8 OR, 11 XR)
        Class    324 :  ELECTRICITY:  MEASURING AND TESTING
        324/323        OF GEOPHYSICAL SURFACE OR SUBSURFACE IN SITU
        324/332        .With radiant energy or nonconductive-type
                             transmitter
        324/334        ..With separate pickup
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        Class    324 :  ELECTRICITY:  MEASURING AND TESTING
        324/323        OF GEOPHYSICAL SURFACE OR SUBSURFACE IN SITU
        324/332        .With radiant energy or nonconductive-type
                              transmitter
        324/334        ..With separate pickup
        324/338        ...Within a borehole
        324/339        ....By induction logging
        324/341        .....To measure dielectric constant

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        Class    324 :  ELECTRICITY:  MEASURING AND TESTING
        324/323        OF GEOPHYSICAL SURFACE OR SUBSURFACE IN SITU
        324/332        .With radiant energy or nonconductive-type
                            transmitter
        324/334        ..With separate pickup
        324/335        ...Employing multiple frequencies

  6  324/343        (0 OR, 6 XR)
        Class    324 :  ELECTRICITY:  MEASURING AND TESTING
        324/323        OF GEOPHYSICAL SURFACE OR SUBSURFACE IN SITU
        324/332        .With radiant energy or nonconductive-type
                              transmitter
        324/334        ..With separate pickup
        324/338        ...Within a borehole
        324/339        ....By induction logging
        324/343        .....Using angularly spaced coils

  3  175/45         (1 OR, 2 XR)
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        175/40         WITH SIGNALING, INDICATING, TESTING OR
                           MEASURING
        175/45         .Tool position direction or inclination
                         measuring or indicating within the bore
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2  175/40        (1 OR, 1 XR)
       Class    175 :  BORING OR PENETRATING THE EARTH
       175/40         WITH SIGNALING, INDICATING, TESTING OR
                         MEASURING

2  175/50        (0 OR, 2 XR)
       Class    175 :  BORING OR PENETRATING THE EARTH
       175/40         WITH SIGNALING, INDICATING, TESTING OR
                         MEASURING
       175/50         .Indicating, testing or measuring a condition
                         of the formation

2  324/342       (0 OR, 2 XR)
       Class    324 :  ELECTRICITY:  MEASURING AND TESTING
       324/323        OF GEOPHYSICAL SURFACE OR SUBSURFACE IN SITU
       324/332        .With radiant energy or nonconductive-type
                             transmitter
       324/334        ..With separate pickup
       324/338        ...Within a borehole
       324/339        ....By induction logging
       324/342        .....Using a toroidal coil

2  702/11        (0 OR, 2 XR)
       Class    702 :  DATA PROCESSING: MEASURING, CALIBRATING, OR
                        TESTING
       702/1          MEASUREMENT SYSTEM IN A SPECIFIC ENVIRONMENT
       702/2          .Earth science
       702/6          ..Well logging or borehole study
       702/11         ...Formation characteristic
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